Advertisement

COVID-19 and Traffic Accidents: Is a COVID-19 Personality Disorder Caused by Viral Damage to the Prefrontal Cortex?

Dec 20, 2022

By Kevin Kavanagh, MD

Article

A study from Canada suggests that not being vaccinated for COVID-19 could mean an individual is at higher risk for an automobile accident. What if it is from brain damage from contracting COVID-19?

Was this automobile accident caused by a COVID-19 personality disorder caused by viral damage to the prefrontal cortex?

(Adobe Stock)

The recent marked increase in violent crimes in the United States and Canada, along with the plethora of mass killings and school shootings during the pandemic, has caused many individuals to question what is happening to our society. Many individuals have related these occurrences to the stresses of the pandemic along with masking, social distancing, and lockdowns, which, at least in the United States, were not followed by large segments of our society.

In December 2022, we heard the news that COVID-19 vaccine hesitancy posed a risk of increased traffic accidents. Right-wing media have ridiculed the *American Journal of Medicine* article. But this observation may be based in reality with a sound explanation.

A recent study in PLOS ONE has observed significant small declines in extraversion, openness, agreeableness, and conscientiousness from 2021 to 2022. It was postulated that these findings relate to “population-wide stressful events” associated with the pandemic. However, other studies have documented resilience after other natural disasters, such as earthquakes and hurricanes.

Read more

Prevention | COVID-19 | Hand Hygiene | Personal Protective Equipment

Brain Damage From COVID-19?

However, we must consider the possibility that the observed behavior aberrations may directly result from the infection and the central nervous system damage it has caused. This theory centers around damage to the frontal lobe in the area of the prefrontal cortex. A variety of emotional-social disturbances can occur with lesions to this area. Joseph Barrash et al, have reported the following regarding lesions in regions of the prefrontal cortex: "Irritability, impatience, and lability are common manifestations along with deficits in abilities critical to interpersonal sensitivity and socially appropriate behavior, including deficient self-monitoring of social behavior" along with impairment with "moral reasoning and judgement." Dysexecutive personality disturbance can also occur which is associated with "impaired cognitive control and

the latter associated with deficits in emotional/social behavior and decision-making."

The prefrontal cortex acquires and implements the "rules of the game" needed to participate in our society. A particular area of the prefrontal cortex, the orbitofrontal cortex, is the essential area of the brain. It is also important in the modulation of antisocial behavior and in the modulation of reactive aggression. In other words, the prefrontal cortex is involved in determining when aggression is and is not appropriate. An autopsy study recently published in *Nature* also found extensive distribution of the SARS-CoV-2 virus throughout the body, including the brain."

There have been multiple studies that have documented damage to the frontal cortex with COVID-19. One of the first studies was a UK Biobank which described a "deleterious impact" of SARS-CoV-2 on the olfactory cortical system, along with a reduction in grey matter thickness in the orbitofrontal cortex and damage to tissues connected to the primary olfactory cortex. This damage was associated with a reduction in brain size. The orbitofrontal cortex (sometimes referred to as the secondary olfactory cortex), amygdala, and limbic system have an extensive connection to the olfactory cortex and are involved in memory and emotions. The authors of the UK Biobank study also noted that "participants who were infected with SARS-CoV-2 also showed on average a greater cognitive decline."

Some individuals have postulated that the olfactory bulb is a possible entry point into the central nervous system. Over

50% of SARS-C0V-2 patients have reported a loss of smell. An article in the *Proceedings of the National Academy of Sciences* documented infection of astrocytes in 26 patients who died from COVID-19. They also documented "severe acute damage" to the orbitofrontal region. The authors' postulated: "The high proportions of anosmia and dysgeusia support the idea of the virus entering the nervous system, more specifically the orbitofrontal region (due to the proximity and communication with the nasal cavity)." The corresponding author, Daniel Martins-de-Souza, PhD, and associate professor of biochemistry and head of proteomics at the University of Campinas in Brazil, described how SARS-CoV-2 uses the protein "neuropilin" in its invasion of the central nervous system since astrocytes "don't have the (ACE-2) protein in their membranes."

These findings also have broader implications for all of society. Severe COVID-19 (hospitalized patients on ventilators) has been associated with 70 and corresponds to a 7-point decline in IQ. For those treated at home with uncomplicated respiratory symptoms, the decline approximated an average of a little over 1 IQ point (calculated from Figure 2 in the paper). Unfortunately, repeated infections can cause additive damage in those with long COVID-19; thus, even small decreases in IQ may become substantial.

We Must Avoid Reinfections of COVID-19

Thus, we must avoid reinfections. Becoming vaccinated and boosted, along with masking, social distancing, and avoiding poorly ventilated venues, are public health strategies that need

to be used. There are, however, segments of our society that mitigate the usefulness of these interventions and the dangers of the virus. Sometimes, they become forceful, unduly aggressive, and lose control of their emotions. Public health professionals worldwide have been threatened, and many have left the field.

In the United States, this loss of emotions is exemplified by a toxic environment of partisan politics. A segment of the far-right conservative movement appears to have fared worse than others, with many shunning masks and vaccines. One study found that a "…Republican trifecta and conservative voter political lean independently remained significantly associated with an 11%–26% higher COVID-19 mortality rate." Another study from the University of Maryland observed an additional 72.9 deaths per 100,000 people in majority Republican counties compared to majority Democratic counties during the pandemic. Another study from the National Bureau of Economic Research, with support from the Yale School of Public Health, has found a 76% higher excess death rate for Republicans compared to Democrats. Germany also has a far-right movement that attempted to storm the capitol and rallied around rules relating to lockdowns and masks.

Suppose COVID-19 produces a lasting COVID-19 personality disorder due to anatomical damage of the orbitofrontal cortex created by SARS-CoV-2 infection. In that case, those segments of the population that shun public health interventions and aggressively seek to stop general health measures may be entering into a vicious cycle of decline. As repeated infections

occur, damage to the brain increases, resulting in decreased emotional control and increased aggression.

What Can We do?

All of this makes it imperative that we slow the spread of this disease and have clear and consistent messaging regarding the risks of COVID-19 and what mitigation procedures can be implemented. Businesses should set aside early morning hours for mandatory masking (well-fitted high-quality masks, such as N95s) to allow high-risk individuals to shop safely and use upper room UV-C germicidal lighting. In addition, online and curbside services for restaurants and retail establishments should be expanded. Above all, we need a warp-speed initiative to develop a mucosal vaccine that offers the best hope to mitigate the spread of this disease.

GigaGen Expands Contract With US Department of Defense for Synthetic Antibody Treatments for Botulinum Neurotoxins

Nov 27, 2023

By Infection Control Today® Editorial Staff

News *Article*

GigaGen, a biotech company, secures an $11.8M contract expansion with the US Department of Defense to develop synthetic human antibody treatments for botulinum neurotoxins.

Infection Intel: Staying Ahead with Company Updates and Product Innovations

GigaGen, a biotechnology company specializing in antibody drugs for various medical applications, including immune deficiencies, infectious diseases, and cancers, has announced an expansion of its contract with the US Department of Defense's (DOD) Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense (JPEO-CBRND). The contract modification, awarded through the Army Contracting Command, increases the total grant value to $11.8 million.

The expanded contract aims to use GigaGen's innovative platform capabilities to rapidly develop synthetic human antibodies for treating botulinum neurotoxins (BoNT) A and B. This development will encompass manufacturing and investigational new drug (IND)-enabling studies, with a focus on enhancing the potency and military utility of these antibody treatments.

Read more

Prevention | Infection Intel | Advanced Technology

To learn more about the collaboration, Carter Keller, MBA, BSE, the CEO of GigaGen (a Grifols company), interviewed with *Infection Control Today®* (*ICT®*)

***ICT*: Can you provide more details about the expansion of GigaGen's contract with the DOD and how it will contribute to the development of synthetic human antibodies for botulinum neurotoxins (BoNT) A and B?**

Carter Keller, MBA, BSE: As part of the contract, GigaGen will demonstrate its platform's capabilities by producing recombinant polyclonal antibody products that target DOD-priority pathogens, including a drug designed to neutralize BoNT A and B, with high potency and military utility.

This program expansion reaffirms the DOD's confidence in GigaGen's technology and its commitment to support the development of the BoNT recombinant polyclonal antibody therapeutic.

The agreement will also allow the DOD to evaluate GigaGen's platform against additional biological threats and support functional testing, manufacturing, and evaluation of recombinant polyclonal drugs that meet specific performance objectives.

***ICT*: GigaGen's hyperimmune platform is described as a novel way to develop synthetic polyclonal antibodies. Could you explain how this platform works and the potential advantages of synthetic polyclonal antibodies over natural immune responses?**

Carter Keller, MBA, BSE

(Photo courtesy of GigaGen)

CK: A recombinant (synthetic) polyclonal antibody therapy consists of thousands of antibodies that are made in the laboratory to treat disease in the same way a natural immune system would – with a diverse antibody response.

Individuals exposed to BoNT or other pathogens might not be able to clear the exposure naturally before severe symptoms occur. GigaGen's technologies copy and recreate antibody responses for a particular pathogen, in this case, BoNT. Because recombinant therapeutics can be bioengineered, GigaGen can create therapeutics that are more powerful than what the natural antibody response can provide. This includes enriching the product with antibodies that target the most susceptible regions of the toxin or pathogen.

The synthetic polyclonal antibody drugs would be given as a potent "custom-made" immune system tailored against BoNT.

***ICT*: This contract expansion aims to support advanced development activities, including manufacturing and IND-enabling studies. What are the key milestones and goals in demonstrating improved potency and military utility for these synthetic antibodies?**

CK: Our next milestone is to demonstrate *in vitro* and *in vivo* BoNT neutralizing potency compared to international treatment standards.

Current drugs include human hyperimmune drugs, which are plasma-derived products comprising antibodies from individuals who have been vaccinated with inactivated BoNT. BoNT hyperimmunes are in short supply and cannot be used to prevent intoxication. Other BoNT therapeutics include a horse-derived immunoglobulin that has a very short half-life and can only be used to treat patients after exposure. Recombinant human antibodies, like GigaGen's drugs, have a known long half-life and can be given to both people who are at risk of exposure and those experiencing BoNT intoxication. GigaGen's therapeutics are the only recombinant hyperimmune treatments currently under investigation.

***ICT*: How does GigaGen plan to ensure the rapid creation and expression of polyclonal antibody cell banks against BoNT A and B? Are there any innovative technologies or methods being utilized for this purpose?**

CK: GigaGen starts with blood from BoNT-immunized animals that produce human antibodies with the goal of reproducing BoNT-specific immune responses. The company uses microfluidic technology to capture millions of individual

antibody-producing immune cells (called B cells). It then extracts their antibody-coding DNA and creates cell lines that express the recombinant (synthetic) human antibodies of interest for the disease. The antibody-producing cell line can then be used to continuously manufacture the therapeutic of interest at existing manufacturing facilities at large scale.

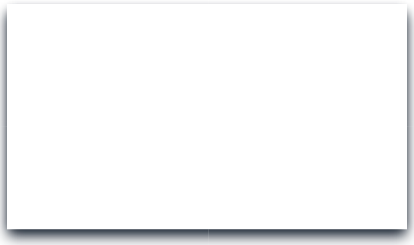
Polyclonal cell lines can be designed to target specific antigens or be developed to be broadly reactive, targeting many diverse pathogen antigens. The anti-BoNT sequences are selected and enriched in the cell bank to identify the optimal antibodies that neutralize all BoNT variants. Should a new variant or pathogen arise, GigaGen's technology can be leveraged to develop new or updated cell lines and produce the new product within months of pathogen identification.

Last year we published research describing our GMP manufacturing. We optimized production yield, demonstrated consistency across batches, and generated a highly pure product ready for clinical use. GigaGen's treatments are unique because they are highly potent and recreate the natural antibody diversity using a single manufacturing run. There are antibody cocktails in development that are a mixture of monoclonal antibodies, each produced through individual cell lines. GigaGen's approach reduces the time required to get the product through regulatory approval, streamlining the process to reach patients.

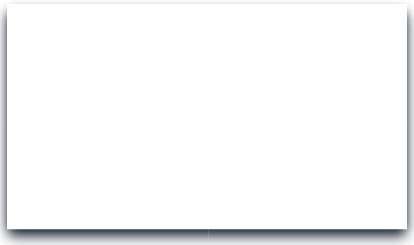
***ICT*: What impact do you anticipate this effort will have on the U.S. Department of Defense's preparedness goals and its ability to respond to known or emerging threats related to botulinum neurotoxins?**

CK: The DOD has a multifaceted approach to preparedness and response concerning known or emerging threats. This involves investing in research to understand these threats better and create treatments and technologies to protect the health of the US population. We're working with the DOD to explore the full potential of GigaGen's platform technology and quickly develop effective therapies against deadly pathogens. The lessons from the COVID-19 pandemic emphasize the urgency of quick action in response to emerging threats. GigaGen's platform can deliver rapid responses to them.

Related Videos



Uncovering the Hidden Dangers: A Comprehensive Study on Insulated Medical Devices From 2021 to 2022



Overcoming Challenges to Eye Device Reprocessing: A 3-Year Study

Pior
Fungi

Do Not Sell My Personal Information

Contact Info

2 Clarke Drive
Cranbury, NJ 08512

609-716-7777

© 2023 MJH Life Sciences™.
All rights reserved.